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THE INFLUENCE OF INITIAL ABILITY ON METACOGNITIVE SKILLS THROUGH INQUIRY LEARNING STRATEGY

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Abstract

The research aimed to know the contribution of initial abilities on metacognitive skills through inquiry learning strategy. The research subjects were college students at the Study Program of Primary School Teacher Education enlisted in Basic Concept of Natural Sciences Courses consisted of two classes: Class A used guided inquiry learning strategy and Class B used free inquiry learning strategy. Instrument used was essay test using rubric from Corebima. Data analyzed using regression statistics analysis. The analysis result indicates that Adjusted R Square for class using guided learning strategy was 35.8%, whereas for class using free inquiry learning strategy was 2%.

Keywords: initial ability, metacognition, inquiry

Introduction

Basic Concept of Natural Sciences course is a requirement course for the subsequent courses in the Study Program of Primary Teacher Education, such as Low Natural Sciences Learning, Natural Sciences Problem Solving and Natural Sciences Laboratory Learning courses. Therefore, students are demanded to understand the content more by managing their way in self-learning and be able to control their own cognitive or metacognitive process.Metacognitive is defined as a consciousness and control over cognitive process (Eggen &Kauchack , 1996 in Corebima, 2009), or think about a thinking (Livingstone, 1997), and a process to know and monitor a thinking or cognitive process (Arends, 1998). Veenman, Van Hout-Wolters, & Afflerbach(2006)divides metacognitive into two components, namely: (1) metacognitive knowledge, and (2) metacognitive skills. Metacognitive knowledge relates to declarative knowledge, procedural knowledge, and conditional knowledge to solve problems. Metacognitive skills relate to prediction skill, planning skill, monitoring skill, and evaluation skill.

Metacognitive skills development is a valuable educational goal since the skills could help in creating self-regulating learners (Eggen &Kauchack , 1996 in Corebima, 2009). Metacognition is important for success learning since it allows individual to better manage their own cognitive skills and to determine improvable weaknesses by building new cognitive skills.Metacognitive skills also play role in comprehension and memory(Flavell, 1979). Memory, in this case, refers to memory of past knowledge mastered by the students. The more knowledge is remembered by the students either through reading, memorizing, or understanding, the better for the students since learning outcome exists only if there is something to remember and the memory can be used in the next learning process (Nasution, 2000).

Based on grade in the 1st semester of 2017/2018 for Basic Concept of Natural Sciences 1 indicates that students' metacognitive skill in very poor level was 37.61%, poor was

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37.61%, fair was 17.43%, good was 3.67%, and excellent was 3.67%. It was due to the use of traditional approach emphasizing on memorizing in learning. Zubaidah(2016)stated that an approach that stresses on memorizing will not develop students' critical thinking skill or independency.Scott(2015)stated that there are various forms of learning that could help students to gain understanding and skills appropriate for the twenty-first century, among others, personal learning strategy, collaborative learning, and informal learning. One of learning strategies appropriate for the twenty-first century is inquiry learning strategy. According to Boyer Report Commision (1998) in Lee (2010), guided inquiry is a strategy suggested for various teachings in the university. Based on American Association for the Advancement of Science (AAAS), 1993; National Research Council (NRC),1996, 2000, Schwab (1962) in Zions, *et al* (2012), inquiry learning is a foundation of sciences teaching. Inquiry learning helps students to learn knowledge, master how to do science, and understand the nature of sciences.

Based on several research results, such as Kristiani, Susilo, Rohman, & Aloysius, (2015), TEQI (Thinking Empowerment by Questioning and Inquiry) learning strategy was recommended to develop metacognitive skills and attitudes. It supports a research conducted by Chang and Mao (1998) indicating that students treated with inquiry learning gained higher score than those of students treated with traditional learning.In addition to learning strategy, another factor influencing the success of learning is initial ability (learning outcome gained by the students) (Degeng, 2013). Initial ability plays essential role in improving the meaningfulness of learning that in turn affects the next process. It is in line with Degeng, Ristanto(2010)stated that students who had high initial knowledge had high performance and attitude. According to Primartadi(2012), there were differences between students who had high and low academic achievement. Students with high academic achievement tended to have better learning outcome average than students who had low academic achievement.To achieve metacognitive skills learning outcome in Basic Concept of Sciences 2 course, inquiry learning strategy is an appropriate innovative strategy by showing initial ability to students thus learning goals could be achieved.

Problem Formulation

The problem formulation of the research is: how the contribution of initial ability on metacognitive skill in a class that use guided inquiry learning strategy and a class that use free inquiry learning strategy?

Hypothesis

The research hypothesis is that initial ability has larger contribution on metacognitive contribution in a class that use guided inquiry learning strategy than those in a class that use free inquiry learning strategy.

Research Method

The research used a quasi-experiment since the researcher did not conduct subject selection in random instead it accepted all classes existed at the school where the researcher conducted the research (Setyosari, 2013). The research subjects were college students of the Study Program of

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Primary Teacher Education at University of Nusantara PGRI Kediri in the 2nd semester of 2017/2018, which were 70 students.

The research instrument was in form of essay test using Corebima's rubric (2009) and initial ability was taken from grade in previous semester. Data analysis technique used regression with the following steps: (1) descriptive statistics calculation, (2) normality test, (3) multicolinearity test, and (4) regression test.

Research Result

Table 1.Regression Test of Guided Inquiry Class

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,615[a]	,378	,358	1,55318	2,275
a. Predictors: (Constant), KAIT					
b. Dependent Variable: KMIT					

Table 2. Anova of Guided Inquiry Class

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46,842	1	46,842	19,418	,000[a]
	Residual	77,195	32	2,412		
	Total	124,037	33			
a. Predictors: (Constant), KAIT						
b. Dependent Variable: KMIT						

Table 3. Regression Test of Free Inquiry Class

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,174[a]	,030	,002	1,26038	2,217
a. Predictors: (Constant), KAIB					
b. Dependent Variable: KMIB					

Table 4.Anova of Free Inquiry Class

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,695	1	1,695	1,067	,309[a]
	Residual	54,011	34	1,589		
	Total	55,706	35			
a. Predictors: (Constant), KAIB						
b. Dependent Variable: KMIB						

Table 1 indicates that class that used guided inquiry learning strategy had R Adjusted of 0.358. It means that students' initial ability had a contribution of 35.8% on metacognitive skills. It is supported by a significance value that was smaller than 0.05 as indicated in Table 2.

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Table 3 indicates that class which used free inquiry learning strategy had R Adjusted of 0.002. It means that students' initial ability had contribution of 0.2% on metacognitive skills. It is supported by a significance value that was bigger than 0.05 as indicated in Table 4.

DISCUSSION

The research result foundthat initial ability gave different contribution when the learning strategy used was different. Table 1 and Table 3 indicate that initial ability will give substantial contribution with the use of guided inquiry learning strategy compared to free inquiry learning strategy. It is in line with a research by Yewang (2017) and Marheni, Muderawan, & Tika(2014)stated that learning outcome of students who used guided inquiry learning strategy was better than those of students who used free inquiry learning strategy.

In their research, Ristiani, Dantes, & Tika (2014), Rianti (2017) stated that learning outcome of students who used inquiry learning strategy was better than those of students who used conventional learning strategy. Chin (2004) in Alexander and Tan (2008), one of the distinguishing characters from students who conduct inquiry was their ability to use questioning technique, such as reflecting and its activities.

In learning using guided inquiry learning strategy, students are guided in each of their way by the lecturer who responsible for the course by conducting initial discussion through questioning to guide students in problem formulation. After students formulate the problems, the next step would be hypothesizing based on problem formulation that has been made. To prove the hypotheses, students should collect data by conducting experiment facilitated by the lecturer. The last step in guided inquiry learning strategy is concluding based on the experiment result data.

For learning using free inquiry learning strategy, the initial step would be the same as those in guided inquiry, which is initial discussion through questioning the students. The next step would be students formulate problems to be studied. After problem formulation, students make hypothesis according to the problem formulation. To test the hypothesis, students design their own experiment thus there will be differences in each group regarding their experiment and consequently, variation in knowledge related to the material.

In guided inquiry learning strategy, students receive full guidance and motivation from the lecturer thus they could be directed and focused on material learned. In free inquiry learning strategy, however, students are independent in learning thus they are less directed and less focus, whereas lecturer only observes the learning process and will guide students who find difficulties. In guided inquiry learning strategy, students are very structured in constructing knowledge since they have guidance in the learning process. For free inquiry learning strategy, students are provided with wide opportunities to gain knowledge, but less direction in constructing their knowledge.

CONCLUSION

Based on the above description, it can be concluded that initial ability had influence on metacognitive skill.By using guided inquiry learning strategy it gave larger contribution than using free inquiry strategy with contribution of 35.8% for guided inquiry learning strategy and 0.2% for free inquiry learning strategy.

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